DMA Toolkit

Section IV

Grade Level Resources

DMA 8th grade:

- Mathematical Terms and Vocabulary
- Possible Targeted Content and Skills
- Practice Assessments and Prompts
- Sample Lesson Plans

Idaho Direct Mathematics Assessment
K-12 Toolkit
State Department of Education

Eighth Grade Mathematical Terms and Vocabulary

A
- absolute value
- acute angle
- adjacent
- algebraic expression
- approximate
- area
- average
- axis (axes)

B
- bar graph
- base (exponential)
- base (geometric)
- billionth

C
- Celsius
- centi-
- circle graph
- circumference
- column
- combination
- commission
- common denominator
- common factor
- common multiple
- composite number
- cone
- congruent
- conjecture
- consecutive
- convert
- coordinate plane
- cross product
- cube
- cubed
- cylinder

D
- data
- degree
- denominator
- dependent
- diagonal
- diagram
- diameter
- difference
- digit
- discount
- distance

E
- equally likely
- equation
- equilateral triangle
- equivalent
- estimation
- evaluate
- event
- expanded notation
- exponent
- expression

F
- factor
- Fahrenheit
- formula
- fraction bar
- frequency
- function

G
- gain
- gallon
- gram
- graph
- greatest common factor

H
- hexagon
- height
- hundredth
- hypotenuse

I
- improper fraction
- independent
- inequality
- infinite
- integers
- intersecting lines
- inverse operations
- irrational numbers
- isosceles triangle

K
- kilo-

L
- label
- least common denominator
- least common multiple
- legs of a right triangle
- length
- line
- line graph
- line segment
- line symmetry
- liter
- loss
- lowest terms

M
- magnitude
- mean
- median
- meter
- metric system
- midpoint
- mile
- milli-
- millionth
- mixed number
- mode
- multiple

N
- natural numbers
- number line
- numerator

O
- obtuse angle
- octagon
- operation (numerical)
- opposite
- order
- order of operations
- ordered pair
- origin
- ounce
- outcome

P
- parallel lines
- parallelogram
- pattern
- pentagon
- percent
- perimeter
- perpendicular
- pi (π)
- pictograph
- pint
- place value
- plane
- plot
- point
- polygon
- population
- pound
- prediction
- prime factorization
- prime number
- prism
- probability
- product
- profit
- proportion

Q
- quadrant
- quadrilateral
- quart
- quotient

R
- radius
- random
- range
- rate
- ratio
- rational numbers
- ray
- real numbers
- reasonable
- reciprocal
- rectangle
- reflection
- regular
- relation
- repeating decimal
- rhombus
- right angle
- right triangle
- rotation
- rounding
- row

S
- sales tax
- sample
- scale drawing
- scalene triangle
- scatterplot
- scientific notation
- semi-
- sequence
- set
- similar figures
- simplify
- solution
- sphere
- square
- square unit
- squared
- statistics
- straight angle
- sum
- surface area
- symmetry

T
- table
- tax
- tally
- tenth
- term
- thermometer
- thousandth
- ton
- translation
- trapezoid
- triangle
- triple
- twice

U
- unknown
- unit

V
- variable
- Venn diagram
- vertex
- volume

W
- whole number
- width

Possible Targeted Content and Skills

With references to Achievement Standards

For midyear 8th grade assessment, prompts will be restricted as indicated in italics.

- **Basic Arithmetic, Estimation and Accurate Computations**
  1. Compute with decimals, integers, and fractions 337.01.a 337.02.a
  2. Convert fractions, decimals, and percents 337.01.a
  3. Compare and order decimals, fractions, and integers 337.01.a,c,e
  4. Apply rates, ratios, proportions and percents 337.01.a 337.02.a 339.03.a 339.02.a
  5. Estimate with decimals and fractions 337.03.a
  6. Recognize and compute second- and third-degree exponents 337.02.d
  7. Evaluate mathematical expressions using the order of operations 337.02.a,c 337.02.a,e 340.02.b

- **Mathematical Reasoning and Problem Solving**
  1. Understand and use a variety of problem-solving skills 338.01.a,b
  2. Use reasoning skills to recognize problems and express them mathematically. 338.02.a,b
  3. Apply appropriate technology and models to find solutions to problems. 338.03.a
  4. Communicate results using appropriate terminology and methods 338.04.a
  5. Apply formulas 338.01.a

- **Concepts and Principals of Measurement**
  1. Use rates to make indirect measurements 339.02.a
  2. Understand and use proportions, ratios and scales 339.03.a
  3. Understand units and their relationship to one another and to real world applications 339.04.a

- **Concepts and Language of Algebra**
  1. Use variables and algebraic expressions 340.01.a,b 339.01.a,b
  2. Solve equations 340.03.a 340.02.a-c

- **Concepts and Principals of Geometry**
  1. Measure, compute and compare perimeters of polygons and circumferences of circles 339.01.a,b,c 341.01.b,c 339.02.a 339.04.a
  2. Compute and compare areas of rectangles, triangles and circles 341.01.c
  3. Identify and classify angles 340.01.a,h 341.01.b,c
  4. Identify and classify polygons 341.01.b
  5. Apply geometric properties and relationships *(e.g. symmetry, congruency, and similarity)* 339.01.c 341.01.a,c,d,g 341.01.a,c,d 341.02.a
  6. Recognize relationships of parallel and perpendicular lines 341.01.c
  7. Plot points on the coordinate plane 341.03.a
  8. Find and compare surface area and volumes of rectangular prisms 340.01.f 339.01.b,c,d 3415.01.a,c,e,f

- **Data Analysis, Probability and Statistics**
  1. Make predictions based on data given or collected 342.05.a
  2. Find and interpret measures of central tendencies *(mean, median, mode)* and range of data 342.03.a,b
  3. Organize, display and analyze data *(graphs, charts, tables, diagrams, plots)* 342.02.a 342.01.a
  4. Understand concepts of chance *(listing and counting outcomes, calculate simple probabilities)* 342.04.a,b,c

- **Functions and Mathematical Models**
  1. Recognize, generate, and extend sequences and patterns 340.01.a, 343.01.a
  2. Analyze functional relationships *(i.e., how change in one quantity affects change in another*) 343.01.b 343.01.b 340.03.b

Achievement Standards can be obtained on the internet at: http://www.idahoboardofed.org/saa/standards.asp

2002- 03 Idaho Eighth Grade Direct Mathematics Assessment

Name _____

It is important that you explain and show how you solved the problems on this assessment. If you use a calculator, show how you set up the math.

1. Your school is planning a snowboarding trip to a local resort as part of the advanced P.E. class. Each student must purchase a regular or P.E. class package.

Regular Package		**P.E. Class Package**		**Lunch**	
Lift pass	$22.00	Lift pass	$ 6.00	Monster burger	$5.95
Group Lesson	$18.00	Group lesson	$ 7.00	Fries	$2.35
Snowboard	$25.00	Snowboard	$13.00	Drink	$1.70

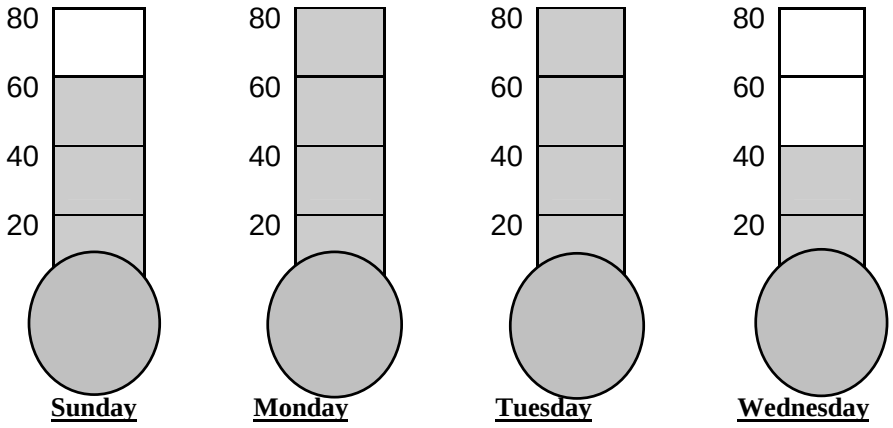
a. How much would you save by choosing the P.E. class package? *Show or explain how you found your answer.*

b. If you were to go snowboarding using the regular package, the snowboard rental would represent what percent of the total cost? *Show or explain how you found your answer.*

c. At lunchtime you decide to have a monster burger, fries, and a drink. Find the total cost of lunch including a 6% sales tax. *Show or explain how you found your answer.*

Read problems 2, 3, 4, and 5 on this and the next two pages. Select three problems to answer. Answer ALL of the parts of the three problems you select to answer. Cross out the one problem that you do not choose to answer.

2. During the first four days of last week, Dan recorded the 10:00 a.m. temperature. Use the data below to answer the following prompts.



a. Make a graph to represent the temperature.

b. Find the mean temperature for the four-day period. *Show or explain how you found your answer.*

c. On Tuesday at 7:30 a.m., the temperature was 35°. Determine the rate of change, in degrees per hour, between 7:30 a.m. and 10:00 a.m. *Show or explain how you found your answer.*

d. If the temperature changed at a constant rate on Tuesday, determine the temperature at 8:45 a.m. *Show or explain how you found your answer.*

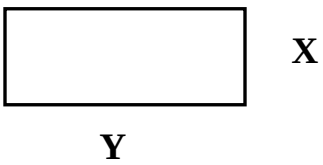
3. The rectangle shown here is 1 unit by 2 units.

a. Find the perimeter and the area of this rectangle. *Show or explain how you found your answer.*

b. Sketch and label a rectangle that is 4 units by 8 units. Find the perimeter and the area of this second rectangle. *Show or explain how you found your answer.*

c. What is the ratio of the perimeters of the first rectangle to the second rectangle? What is the ratio of the areas of the first rectangle to the second rectangle? *Show or explain how you found your answer.*

d. Describe the perimeter and area of a rectangle that is three times as long and three times as wide as the rectangle shown here. *Show or explain how you found your answer.*



4. Each time you buy a hamburger or hot dog at BOB'S DRIVE-IN, you get a card with three squares on it. When you rub each square on your card, a picture of a taco or a drink appears. If all pictures match, you get a free order of fries.

a. List all the possible ordered combinations of pictures you could get when you rub off the squares. *Show or explain how you found your answer.*

b. What is the probability that the card you get will be a winner? *Show or explain how you found your answer.*

c. One day, BOB'S DRIVE-IN gave away 296 cards. Suppose that one fourth of the cards were winning cards. How many orders of fries were given away? *Show or explain your answer.*

d. It costs BOB'S DRIVE-IN $0.23 to buy, prepare, and serve an order of fries. How much did the give-away cost BOB'S? *Show or explain how you found your answer.*

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5. The school drill team has decided to have a car wash for a fund-raiser. They have discovered that 3 girls can wash 2 cars in about 15 minutes. The team has 24 girls.

a. How many cars can the entire team (24 girls) wash in 5 hours? *Show or explain how you found your answer.*

b. If one group of girls washes 40 cars, what fraction of the total do they wash? What percent of the total do they wash? *Show or explain how you found your answer.*

c. The drill team charges $5.00 per car. Find the amount of money that will be left after the team spends 40% of their earnings for summer camp. *Show or explain how you found your answer.*

2002- 03 Idaho Eighth Grade Direct Mathematics Assessment

Name _____

It is important that you explain and show how you solved the problems on this assessment. If you use a calculator, show how you set up the math.

❶ Manuel, Sam and five of their friends are going to order pizza for dinner. A pizza costs $4.99 plus $0.75 per topping.

X = topping was ordered

a. Find the cost of each pizza they ordered and fill in the appropriate spaces in the chart below. Do not include sales tax.

Toppings	Pizza 1	Pizza 2	Pizza 3	Pizza 4	Pizza 5
Olives					X
Mushrooms					X
Pineapple				X	
Sausage		X			X
Pepperoni		X	X		X
Canadian Bacon		X		X	X
Extra Cheese	X				X
Pizza Cost - without tax					$9.49

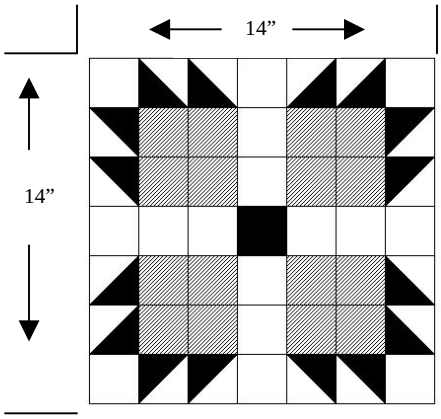
a. What is the **total** cost of the five pizzas, including a 5% sales tax? *Show or explain how you found your answer.*

b. Each pizza has 8 slices. Sam plans to eat two slices from <u>each</u> pizza. What fraction of all the pizzas does he plan to eat? What percent is this? *Show or explain how you found your answer.*

c. Each person pays for his share of the total cost based on the amount of pizza he eats. How much should Sam pay? *Show or explain how you found your answer.*

Read problems 2, 3, 4 and 5 on the next few pages. Select three problems to answer. Answer ALL of the parts of the three problems you select to answer. Cross out the one problem that you do not choose to answer.

❷ The quilt block pictured below is called a "Bear's Paw." It is made by sewing together squares and triangles. Some pieces are black, while others are white or gray. Use the block to answer the questions.



a. If the completed "Bear's Paw" block is 14 inches by 14 inches, what is the area that is shaded black? *Show or explain how you found your answer.*

b. What fraction of the total "Bear's Paw" block is shaded black? *Show or explain how you found your answer.*

c. Juanita needs to cut 2 ½ inch by 2 ½ inch squares from a piece of black material that is 44 inches wide and 36 inches long. What is the maximum number of squares she can cut from this piece of material? *Show or explain how you found your answer.*

❸ Students were surveyed to find out how many pets their families owned.

a. Use the given data to complete the frequency table.

PETS PER FAMILY

3,1, 2, 1, 4, 2, 1, 2, 1, 2, 0, 3, 1, 2, 2, 3, 2, 2, 4, 1, 1, 1, 1, 0, 1, 3

Frequency Table for Pets per Family		
Pets per Family	Tally	Frequency

b. Graph or plot this data in the space provided below. Be sure to include appropriate identifying labels.

c. How many families have 2 or more pets? *Show or explain how you found your answer.*

d. What is the mean number of pets per family? What is the mode? *Show or explain how you found your answer.*

❹ Ron, Leora and Susan all work at the same restaurant. They get paid an hourly wage as well as any tips they receive. They each make different wages based on their work experience.

a. If Ron's hourly wage is $5.00 more than Leora's wage, and Susan's wage is $10.00 less than twice Leora's wage, write an algebraic expression for each of their wages. Be sure to explain your variables.

Ron: **Leora:** **Susan:**

b. If Leora's hourly wage is $8.00, what are Ron's and Susan's wages? *Show or explain how you found your answer.*

c. If, in one week, Ron worked for 32 hours and got $56.25 in tips, how much did he earn? *Show or explain how you found your answer.*

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❺ Roger works for the Department of Fish and Game. To discover how healthy a pond is, Roger needs an estimate of the number of fish in the pond. He asked his son Mark for help.

a. They captured 8 trout, 6 bass and 3 catfish. They tagged and released the fish. They later captured 60 fish. Five of the fish in the second capture had tags. About how many fish are in the pond? *Show or explain how you found your answer.*

b. If you go fishing in this pond, what is the probability that the first fish you catch will be a trout? *Show or explain how you found your answer.*

c. How many of each type of fish are there likely to be in the pond if the ratio of trout to bass to catfish in the pond is the same as in the first capture? *Show or explain how you found your answer.*

2001-02 Idaho Eighth Grade Direct Mathematics Assessment

Name _____

It is important that you explain and show how you solved the problems on this assessment. If you use a calculator, show how you set up the math.

❶ Lamar is planning a trip through Idaho. He designed the following budget and plans to travel approximately 300 miles **each** day.

Food
Breakfast $4 per day
Lunch $7 per day
Dinner $9 per day

Gasoline
$0.11 per mile (300 miles per day)

a. What does Lamar plan to spend if he takes a 3-day trip? *Show or explain how you find your answer.*

b. Day 1 Lamar spent $3.89-breakfast, $4.95-lunch, and $8.30-dinner. Day 2 he spent $4.15-breakfast, $6.85-lunch, and $9.95-dinner. What percent of the 3-day meal budget did he spend?

c. Lamar's car averages 15 miles per gallon of gasoline. Unleaded gasoline costs $1.53 per gallon and premium gasoline costs $1.79 per gallon. Is budgeting $0.11 a mile for gasoline enough for premium? *Show or explain how you find your answer.*

d. Lamar's vehicle holds 18 gallons. How many miles can he travel on one tank of gasoline?

What fraction of his total trip is completed on one tank of gasoline? *Show or explain how you find your answer.*

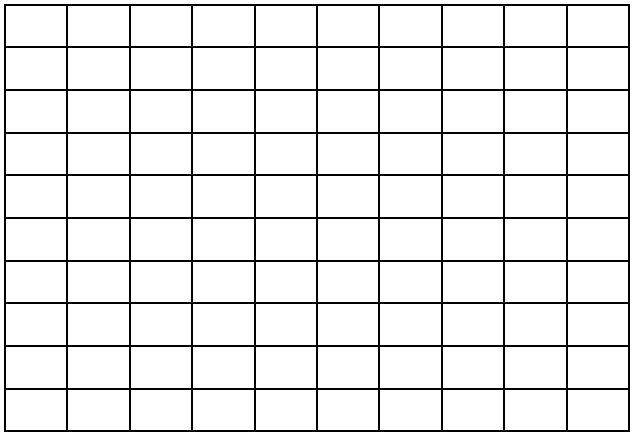
Read the remaining four numbered problems (2, 3, 4, and 5), and select three you wish to answer. Answer ALL of the parts of the three problems you choose to answer. Cross out the problem you choose not to answer.

❷ ABC Cellular charges $1.00 for each call plus $0.25 per minute on a cell phone.

a. Complete the chart to find the charge for each call.

Minutes	Charge
1	
2	
3	$1.75
4	
5	

b. Graph the information below.



c. How many minutes can you talk for $3.00? *Show or explain how you find your answer.*

d. How much will a 15-minute call cost? *Show or explain how you find your answer.*

e. John was charged $3.75. He remembers making 2 calls. One call lasted one minute. How long did the other call last? *Show or explain how you find your answer.*

❸ A gardener had a plot of ground 50 feet by 75 feet and he wanted to fertilize it with bags of fertilizer.

a. What is the area of the plot? *Show or explain how you find your answer.*

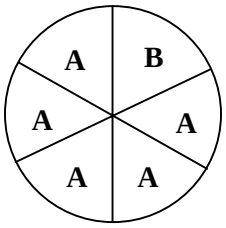
b. A 15 lb. bag of fertilizer costs $13.60 and fertilizes 700 sq.ft. How much will it cost to fertilize the entire garden? *Show or explain how you find your answer.*

c. The gardener decides to subtract a 3 ft path on two adjacent sides from his garden plot. Draw and label a diagram that illustrates the resulting garden and path.

d. How many pounds of fertilizer will the gardener use on his new garden? *Show or explain how you find your answer.*

❹ In their math class, Kate and Jim play a game using the spinner and the following rules:

1) Take turns spinning the spinner.
2) If it lands on an "A" Kate gets **one** point.
3) If it lands on the "B" Jim gets **three** points.
4) The person with the most points wins.



a. For each spin, what is the probability that it will land on an "A"? What are the chances it will land on the "B"? *Show or explain how you find your answer.*

b. Before they start, their teacher asks them to predict what the score will be after **six spins** (three spins each). What would you predict the scores to be for Kate and Jim? Show or explain how you make your predictions.

c. Under these rules, are Jim and Kate equally likely to win this game? Explain. If not, how could you change the rules, **without changing the spinner**, to make it fair?

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❺ Sandy mows yards to earn extra spending money. The price he charges is $12.00 per yard. His parents supply the mower, gas and oil and charge him to cover these expenses.

Plan A	**Plan B**
$2 per **yard** to parents for expenses	$15 a **week** to parents for expenses

a. If he uses Plan A, how much money will Sandy earn if he mows 2 yards in a week? 10 yards in a week?

b. Using Plan B, how much will he make on 2 yards and then on 10 yards? How many lawns earn more profit if Sandy uses Plan A instead of Plan B? *Show or explain how you find your answer.*

2000-01 Eighth-Grade Direct Mathematics Assessment

Name _____

Welcome to the 2001 Direct Math Assessment. It is important that you explain and show how you solved the problems on this assessment. If you use a calculator, show how you set up the math.

1. Karen has been offered jobs by two competing companies. To help her decide which job to take answer the questions below.

a. Each company has offered her a beginning salary for the first year and a raise each year for the second and third year. Complete the following chart to determine which job, including raises will have paid more by the end of the third year.

	Annual Salary	Raises each year for 2 years	Pay year 1	Pay year 2	Pay year 3	Total Pay
Job A	$18,400/year	$2200/year				
Job B	$1,415/month	$2400/year				

b. It will cost Karen 32 cents per mile to drive to and from work. Job A is 9 miles away and Job B is 1 mile away from Karen's house. Compare the cost of driving to and from work if Karen works 240 day per year.

c. What percent of each job's salary would be spent driving to and from work?

d. Taking travel costs in to consideration, in which job will Karen have made more money after 3 years? How much more will she have made?

Read the remaining four numbered problems (2, 3, 4, and 5), and select three you wish to answer. Answer ALL of the parts of the three problems you choose to answer. Cross out the problem you choose to not answer.

2. Use the figures below to answer parts a, b, and c.

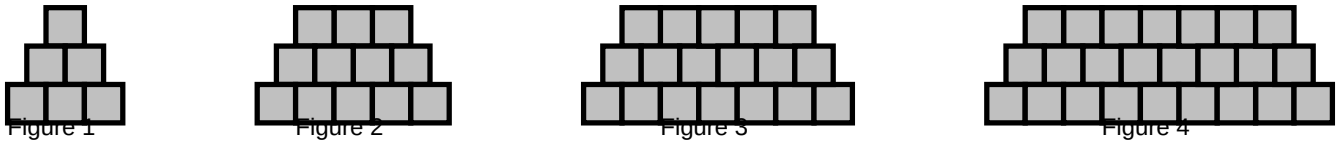


Figure 1 Figure 2 Figure 3 Figure 4

a. **Complete the following table.**

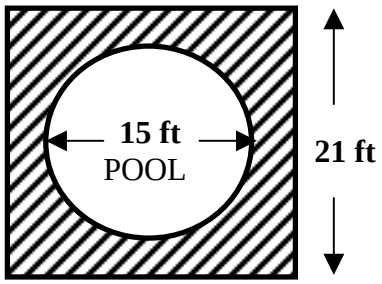
	Figure 1	Figure 2	Figure 3	Figure 4
Number of squares on the top row	**1**			
Number of square in the entire figure	**6**			

b. If we continue adding squares at the same rate, how many squares would be on the top row of figure 5? What is the total number of squares in figure 5? Show or explain how you found your answer.

c. If you were to continue this pattern until we created a 9^{th} figure, how many squares would be on its top row? Show or explain how you found your answer.

d. What would be the total number of squares in the 12^{th} figure of this pattern? Show or explain how you found your answer.

3. A circular pool with a diameter of 15 feet is surrounded by a square redwood deck. The edge of the deck measures 21 feet.



Formulas:
$A = \pi r^2$

a. How many feet of fencing would be needed to go around the outside of the deck? Show or explain how you found your answer.

b. What is the area of the pool? Show or explain how you found your answer.

c. What is the area of the redwood deck? Show or explain how you found your answer.

d. The cost to paint the surface of the deck is $1.50 per square foot. How much will it cost to pain the deck? Show or explain how you found your answer.

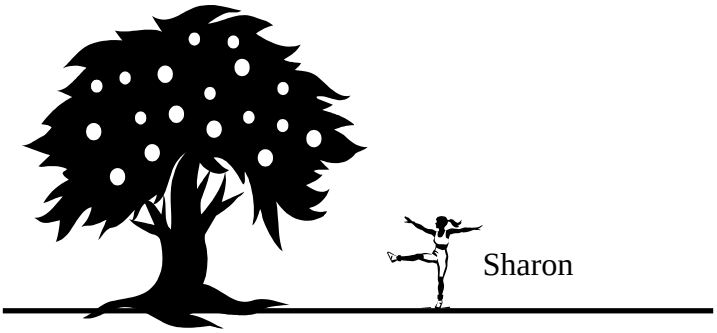
4. Jim has a bag of jelly beans with only four different colors of beans inside. Out of every 10 jelly beans in the bag, 4 were red, 3 were green, 2 were blue, and 1 was orange.

a. What is the ratio of green to red jelly beans in the bag? Show or explain how you found your answer.

b. If there are 60 jelly beans in the bag find the number of each color and complete the following table. Show or explain how you found your answers.

Color	RED	GREEN	BLUE	ORANGE	TOTAL
Number					60

c. What is the probability that Jim will select a **blue** jelly bean if he randomly draws one bean out of the bag? Show or explain how you found your answer.



5. Sharon is 1.5 meters tall. About how tall is the tree? Show or explain how you found your answer.

1999-2000 Idaho Eighth-Grade Direct Math Assessment

Name _____

Welcome to the 2000 Direct Math Assessment. It is important that you explain and show how you solved the problems on this assessment. If you use a calculator, show how you set up the math.

1. Sally, Pat, and Bea are sharing one 36 inch long piece of red licorice. Sally gets ½ of the licorice string, Pat gets 12 inches of the licorice string, and Bea gets the rest of the licorice string.

a. How many inches of the licorice string do Sally and Bea each get? Show or explain how you found your answers.

b. What fraction of the total licorice string does Bea get? What percent of the licorice string is this? Show or explain how you found your answers.

c. The licorice string cost $1.20 without tax. There is a 5% sales tax added to the cost of the price of the licorice. How much does **each** person pay for **their** part of the 36 inch string of licorice? Show or explain how you found these amounts.

Read the remaining four numbered problems (2, 3, 4, and 5), and select three you wish to answer. Answer ALL of the parts of the three problems you choose to answer. Cross out the problem you choose not to answer.

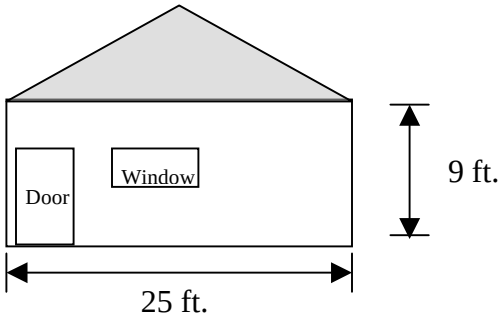
2. Suppose you are being timed on a five mile run. Your plan is to first jog one mile then walk a half-mile and then jog another mile then walk a half-mile and continue this pattern for the five miles of the run.

a. If you stick to your plan, how many of the five miles will you jog and how many will you walk? Show or explain how you found your answer.

b. If you maintain a rate of 8 minutes per mile jogging and 19 minutes per mile walking while your friend Tom jogs the entire race and maintains a rate of 12 minutes per mile, who will finish first? Show or explain how you found your answer.

c. If the run were extended to 10 miles, who do you think would finish first? Show or explain how you found your answer.

3. Mrs. Sanchez is planning to paint one of the rectangular walls in her classroom. A diagram of the wall is shown below.



Length:	25 ft.
Height:	9 ft.
Door:	6 ft. 6 in. by 4 ft.
Window:	5 ft. by 3 ft.

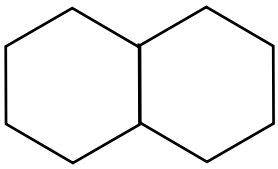
a. Find the total area to be painted. The gable (shaded triangle), window and doors are not to be painted. Show or explain how you found your answer.

b. If a gallon of paint covers 175 square feet, how many gallons of paint does Mrs. Sanchez need to buy? Show or explain how you found your answer.

c. The gable (shaded area) is an isosceles triangles with a height of 3 feet. If Mrs. Sanchez decides to paint the gable as well as the rest of the wall, what is the additional area to be painted? Show or explain how you found your answer.

4. The problem below uses all regular hexagons that have a measure of approximately1 cm on each side.

a. Two regular hexagons measuring approximately 1 cm on each side are drawn below. They share one full side. What is the perimeter of this drawing?



b. Draw the same figure used above and attach a third hexagon to **only one** of the full sides of your first figure. What is the perimeter of the resulting figure?

c. What is the perimeter of 10 regular hexagons placed in a similar way (each new hexagon sharing **only one** full side with the previous figure)? Show or explain how you found your answer.

---

5. You and a good friend Debbie were shopping in a grocery store for soda for a party at school. You noticed that you could buy the soda in a one-liter bottle (approximately 33.8 oz.) or six-packs of 12 oz. cans. The six-pack cost $2.49 and the one-liter bottle cost $1.20. Debbie suggested buying two of the one-liter bottles because it would be cheaper. Being very thrifty, you did a few calculations and said you should buy the six-pack because it would be the better buy. Debbie was impressed and asked how you figured that out.

In the space below explain or show how you knew that the six-pack was a better value than two of the one-liter bottles.

1998-99 Idaho Eighth-Grade Direct Math Assessment

Name _____

Welcome to the 1999 Idaho Direct Math Assessment. It is important that you explain and show how you solved the problems on this assessment. If you use a calculator, show how you set up the math.

❶ In the last student council election, John and Mary both ran for student body president. They each spent money on poster paper, markers, and campaign buttons.

a. Complete the table below to find out how much money John and Mary spent on each of the items they used in their campaigns. (The prices below include sales tax.)

Item	Price each	Number John bought	Amount John spent	Number Mary bought	Amount Mary spent
Poster Paper	$1.25	27		43	
Markers	$1.19	12		17	
Buttons	$1.35	75		63	
		Total	_____	Total	_____

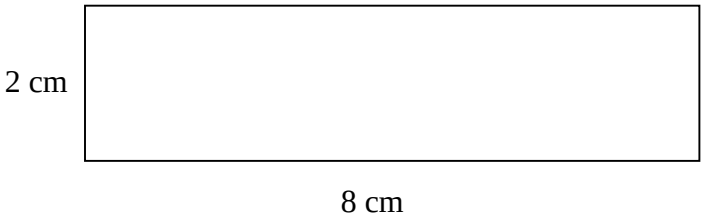
b. John and Mary were each given $200.00 to spend on the campaign. What percent of each student's $200.00 budget was used to pay for election supplies? Show or explain how you found your answers.

c. During the election, 3,200 ballots were cast. Mary received 3/5 of the votes and John received all of the remaining votes. How many more votes were cast for Mary than were cast for John? Show or explain how you found this amount.

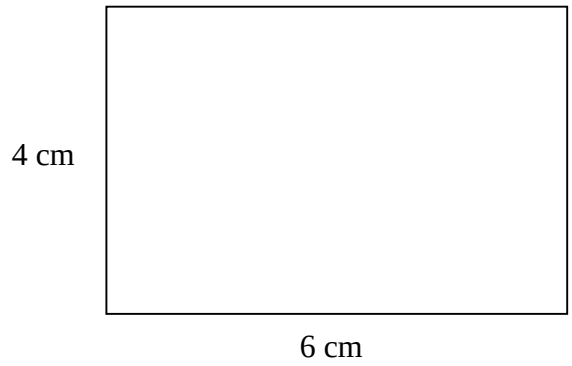
Read the remaining four numbered problems (2, 3, 4, and 5), and select three to answer. Answer ALL of the parts of the three problems you choose to answer. Cross out the problem you do not choose to answer.

❷ Examine the two rectangles below.

Rectangle A



Rectangle B



a. Which rectangle has the largest area? Show or explain how you found this area.

b. Which rectangle has the longer perimeter? Show or explain how you found your answer.

c. Draw and label two rectangles each of which has a perimeter of 16 cm, but have different areas. (The rectangles do not need to be drawn to scale.) Show or explain how you found the area of each rectangle.

❸ The data below shows the test scores of the third-hour math class. In this class, 90-100% is an A; 80-89% is a B; 70-79% is a C; 60-69% is a D; and below 60% is an F.

99, 54, 82, 94, 77, 71, 56, 79, 72, 54, 90, 63,
68, 94, 82, 95, 62, 93, 91, 56, 88, 76, 76, 88, 88

a. Select a type of graph or chart to represent the data (bar graph, tally, circle graph, line plot, etc.). Draw and label the graph.

b. According to your graph or chart, did the class do well on this test? Explain your answer.

---

❹ Jenny's art class is going to make stickers for each of the digits 0 through 9. The stickers will be used individually or combined to make room numbers for the rooms in the school. Suppose the art class makes enough stickers for rooms 1 through 50.

a. Fill in the table to indicate the number of each type of sticker the art class will make.

Sticker	1	2	3	4	5	6	7	8	9	0	Total
Number needed											

b. Show or explain how you found your answers.

❺ To make one batch of chocolate chip cookies, you need the following items:

$\frac{2}{3}$ cups of shortening	3 ¼ cups of flour
¾ cups of white sugar	2 eggs
2 ½ cups of brown sugar	3 teaspoons of vanilla
¼ teaspoon of baking powder	$1\frac{2}{3}$ cups of chocolate chips

You have ¼ cup, 1/3 cup, and ½ cup measuring devices, but you do not have a 1-cup measuring device.

a. How many 1/3 cup measurements of chocolate chips do you need to make a batch of cookies? Show or explain how you found your answer.

b. Explain how you would use the ¼ cup, 1/3 cup, or ½ cup measuring devices to measure the flour, the brown sugar, and the white sugar needed to make the cookies.

c. You plan to make three batches of cookies for the party next week. What is the total amount of shortening that you will need? Show or explain how you found your answer.

1997-98 Idaho Eighth-Grade Direct Math Assessment

Name _____

Welcome to the 1998 Direct Math Assessment. It is important that you explain and show how you solved the problems on this assessment.
If you use a calculator, show how you set up the math.

1. You have been asked to help plan the food for a club party at the lake. There are 27 members in your club. At the store you record the following prices:

1	pkg of 10 hot dogs	$2.79	1	jar of relish (serves 24)	$2.89
1	pkg of 8 buns	$1.19	1	bottle of ketchup (serves 50)	$2.49
1	6-pack of soft drinks	$2.39	1	bottle of mustard (serves 91)	$1.39

a. Sues mom recommends that we buy enough supplies for 42 hot dogs. She also recommends one soft drink per person. List below the number you need of each of the following:

packages of hot dogs _____ bottles of ketchup _____
packages of buns _____ bottles of mustard _____
6-packs of soft drinks _____ jars of relish _____

b. Using the information above, calculate the cost of food for the party. Remember to include Idahos 5% sales tax in your total. Show how you found the total cost.

c. Sam's mom is providing cookies. If 1/3 of the 27 members in the club each eat two cookies, and everyone else eats one, how many cookies should Sam bring? Show how you found the number of cookies.

Read the remaining four numbered problems (2, 3, 4, and 5) and select three you wish to answer. Answer ALL of the parts of the three problems you choose to answer. Cross out the problem you do not choose to answer.

2.

TEN ALL-TIME BEST SELLING YOUNG ADULT PAPERBACK BOOKS			
Title and Year Published	***Author***	***Category***	***Number Sold***
1. *The Outsiders* (1968)	S.E. Hinton	Contemporary Issues	5,855,000
2. *Are You There God? It=s Me Margaret* (1974)	J. Blume	Contemporary Issues	5,278,000
3. *That Was Then, This is Now* (1972)	S.E. Hinton	Contemporary Issues	3,351,000
4. *Where the Red Fern Grows* (1974)	W. Rawls	Adventure	3,347,000
5. *The Witch of Blackbird Pond* (1971)	E. Speare	Historical Fiction	2,445,000
6. *A Wrinkle in Time* (1976)	M. L=Engle	Adventure	2,246,000
7. *Johnny Tremain* (1968)	E. Forbes	Historical Fiction	2,242,000
8. *Rascal* (1964)	S. North	Adventure	2,215,000
9. *Island of the Blue Dolphin* (1971)	S. O=Dell	Adventure	1,876,000
10. *The Pigman* (1978)	P. Zindel	Contemporary Issues	1,786,000
Information taken from *Connections* by Heath Mathematics		**Total**	**30,641,000**

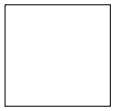
a. Draw and label a **bar** graph which represents the number of books sold for each of the ten books.

b. What fraction of the ten books were published after 1973? _____ Show how you found this fraction.

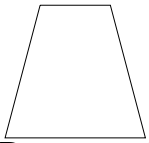
c. The number of *The Outsiders* **sold** is what percent of the total sold of all ten books? _____ Show how you found this percent.

d. What is the average number of books sold? _____ Show how you found this average.

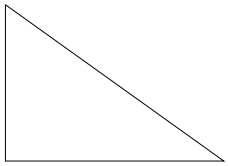
3. a. Draw a straight line through this square to divide it into two regions which have the same area. Explain why you think the two regions have the same area.



b. Draw a straight line through this trapezoid to divide it into two regions which have the same area. Explain why you think the two regions have the same area.



c. Draw a straight line through this right triangle to divide it into two regions which have the same area. Explain why you think the two regions have the same area.



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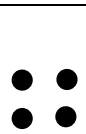
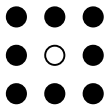
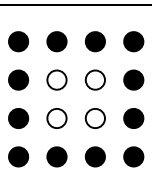
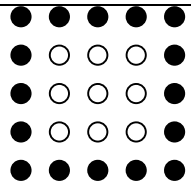
					
Size:	2 by 2	3 by 3	4 by 4	5 by 5	6 by 6
Outline (black disks)	4	8	_____	_____	_____
Inside (white disks)	0	1	_____	_____	_____

Black and white disks are arranged to form squares as shown above. Black disks outline the squares, and white disks are placed inside the outline as shown. (Disks are not stacked on top of other disks.)

a. In the space provided, complete the table by drawing the *6 by 6* square showing the black and white disks, and fill in the missing numbers.

b. How many disks in all would be needed to form a *10 by 10* square? _____
How many **black** disks? _____
How many **white** disks? _____
Explain or show how you found these numbers.

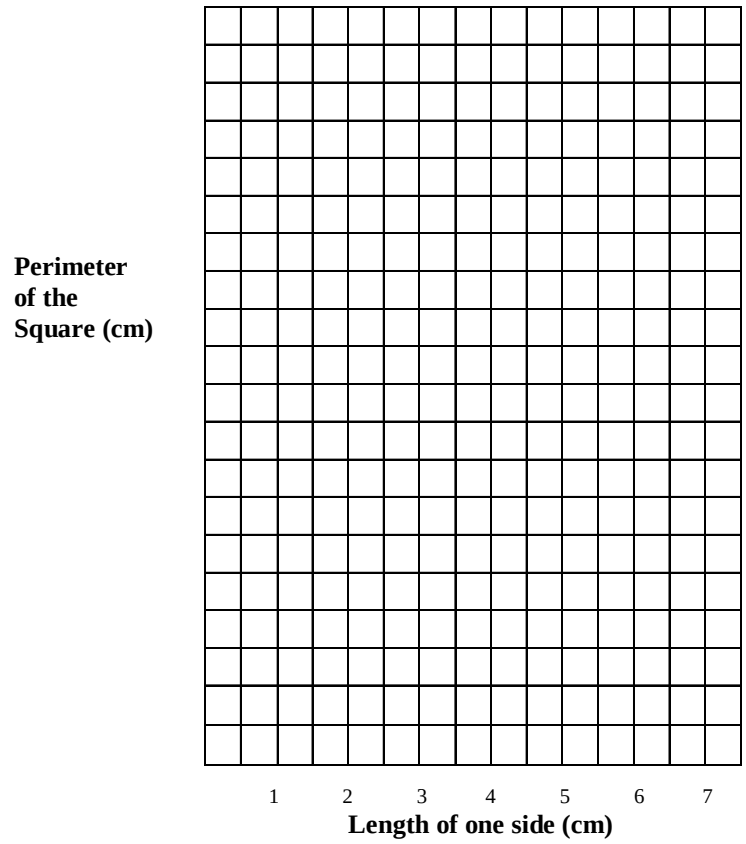
c. How many white disks would be needed to make a square with 81 black disks on each side? _____
Explain how you found this answer.

5. The perimeter of a square is the distance around the square. It is equal to four times the length of a side. ($p = 4s$)

length of one side	perimeter of the square
1 cm	
2 cm	
3 cm	
4 cm	
5 cm	

a. Complete the table of values above to show the relationship between the length of a side and the perimeter of a square, as the length of the side increases from 1 cm to 5 cm.

b. Graph this relationship by plotting the values from the table on the graph at the right, and connect them with a **line**.



c. Explain or show how you could use the graph to estimate the perimeter of a square which has a side of 2.5 cm. Check your estimate by using the formula for perimeter given above.

d. Explain or show how you could use the graph to estimate the length of one side of a square which has a perimeter of 15 cm. Check your estimate by using the formula for perimeter given above.

Eighth Grade Idaho Direct Mathematics Assessment

#8-001 Eighth-Grade Practice Prompt Computations and Relationships

Idaho Power charges customers 4.596 cents per kilowatt-hour of electricity consumed each month. In addition to the cost of the electricity, Idaho Power charges each customer $2.50 per month.

a. If a customer consumed 1851 kilowatt hours during a month, find the total billing amount for that month? Show or explain how you found your answer.

b. If the total billing amount was $29.58, how many kilowatt-hours were consumed that month? Show or explain how you found your answer.

c. A certain refrigerator is labeled with an *Energy Guide* for consumers which reads: *ENERGY CONSUMPTION: 850 kWh per year*. How much will it cost per month on the average to operate this appliance at the rate given above? Show or explain how you found your answer. *(kWh is an abbreviation for kilowatt hours.)*

d. If Idaho Power decreased the rate per kilowatt hour by 10% and increased the customer charge by 50 cents, what would be the new total billing for the 1851 kilowatt hours which were consumed in part a of this problem? Show or explain how you found your answer.

Eighth Grade Idaho Direct Mathematics Assessment

#8-002 Eighth-Grade Practice Prompt Computations and Relationships

On October 20, 1997, Burt traveled from Idaho into Canada. Since he was going to shop and needed to buy gasoline, he exchanged United States dollars (US$) for Canadian dollars (C$). Canada uses a monetary system like the United States with dollars and cents. However, Canadian money is not worth the same as United States money. The exchange rate was C$1.3326 for each US$1.00.

a. Burt exchanged US$800.00 for C$. How many Canadian dollars did he receive? Show or explain how you found your answer.

b. Burt filled up his car at a Canadian gas station. The price for regular no-lead gasoline was 53.2¢ per liter. At the same time in the United States, regular no-lead gas was selling for $1.339 per gallon. Burt did not know the exact conversion between US gallons and the liter, but he knew that a liter is a little bit more than a quart. Compare the cost of gasoline in the U.S. and in Canada.

c. While shopping, Burt bought a diamond ring for his wife. It cost C$599.99. How many US$ would this be? Show or explain how you found your answer.

d. When Burt returned to the United States, he was required to pay 20% duty tax on Canadian purchases over US$400.00. The total of Burt's purchases was C$768.20. How much duty tax was Burt required to pay to the United States? Show or explain how you found your answer.

Eighth Grade Idaho Direct Mathematics Assessment

#8-003 Eighth-Grade Practice Prompt Computations and Relationships

Bricklayers use the formula N = 7LH to determine how many bricks they will need to build a wall. N = the total number of bricks needed, L = length of the wall, and H = the height of the wall.

a. How many bricks will be needed to build a wall 8 feet high and 35 feet long? Show or explain how you found your answer.

b. A bricklayer has 1820 bricks. He needs to build a wall 30 feet long. How tall can the wall be? Show or explain how you found your answer.

c. A brick weighs 1.75 pounds. If a wall is 5 feet high and 12 feet long. How much would the bricks needed to build it weigh? Show or explain how you found your answer.

d. A bricklayer needs to build a wall 4 feet high and 25 feet long. He has $1680 to buy bricks. How much can he spend on each brick? Show or explain how you found your answer.

Eighth Grade Idaho Direct Mathematics Assessment

#8-004 Eighth-Grade Practice *Computations and Relationships*

Roy is having a party and plans to invite seven friends. He wants to serve hamburgers, chips and pop to drink. He has $20 to spend and wonders if he can buy all the supplies for the party.

a. Hamburger costs $1.89 a pound and he can make 4 hamburgers from each pound of meat. Buns are $.75 for a package of 8. How many pounds of hamburger should he buy for 8 people to enjoy two hamburgers each? How many packages of buns will he need? How much will the hamburger and buns cost Roy? Explain.

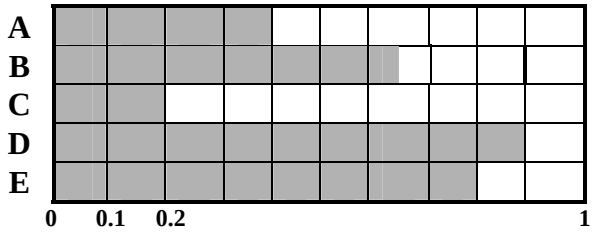
b. Roy also wants to buy two bags of chips at $1.99 each and a can of pop for everyone at $.65 each. How much will the chips and pop cost? Explain.

c. Roy does his shopping and gives the clerk his $20 bill. How much change will she give him back after she figures up his total cost? (Remember to add 5% sales tax)

Eighth Grade Idaho Direct Mathematics Assessment

#8-005 Eighth-Grade Practice Prompt Computations and Relationships

The following bar graph represents decimal values in tenths between 0 and 1 on a number line.



a. Arrange the names of the bars in order from their least to greatest value.

b. Which bar represents the decimal that is half way between 0 and 0.8?

c. What is the value of bar “B”?

d. What is the difference between the value of bar “D” and the value of bar “A”?

e. What is twice the value of the sum of bar “B” and bar “D”? Explain.

Eighth Grade Idaho Direct Mathematics Assessment

#8-006 Eighth-Grade Practice Prompt Computations and Relationships

The temperature in Yellowstone National Park for January 4th at 9:00 AM was -30°F.

a. If the temperature rose 12° from 9:00 AM to 12:00 noon, what was the temperature at noon?

b. From 12:00 noon to 3:00 PM, the temperature rose 2° every 20 minutes. What was the temperature at 3:00PM?

c. The temperature dropped 14° from 3:00 PM to 6:00 PM. What was the temperature at 6:00PM?

d. What was the average temperature for the day?

Eighth Grade Idaho Direct Mathematics Assessment

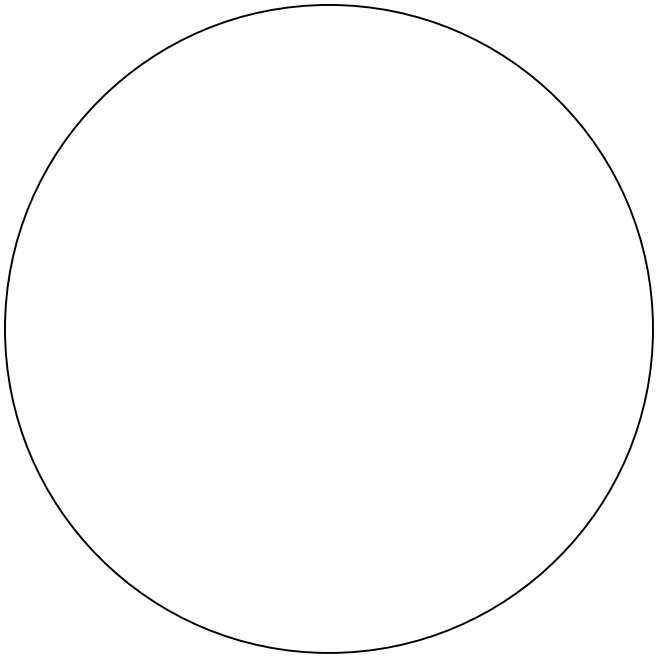
#8-007 Eighth-Grade Practice Prompt Computations and Relationships

Everyone in Class A was asked to choose their favorite sandwich from the following choices: peanut butter and jelly, tuna fish, and meat with cheese. The results of the survey were 17 for meat with cheese, 9 for peanut butter and jelly, and 8 for tuna fish.

a. What is the total number of students in Class A?

b. Figure out the percent of students that chose each type of sandwich.

c. Using your percents and the circle given, make a pie graph to show the results of the survey. Estimate the size of each piece.



Eighth Grade Idaho Direct Mathematics Assessment

#8-008 Eighth-Grade Practice Prompt Computations and Relationships

Kelcey has scores of 75, 95, 85, 96, 97, 92, 93, 81, 86, and 90 on her math tests this semester.

a. Calculate Kelcey's average test score. If an average of 90 is required for an A, would Kelcey receive an A for the semester? Show or explain how you found your answer.

b. If two more 100-point tests are given, what is Kelsey's highest possible average? Show or explain how you found your answer.

c. Using only the original test scores, Kelcey's teacher decides to throw out the lowest score and the highest score. What would Kelcey's average be now? Show or explain how you found your answer.

Eighth Grade Idaho Direct Mathematics Assessment

#8-009 Eighth-Grade Practice Prompt *Patterns and Functions*

Bill created the following secret code:

A=1	G=7	M=13	S=19	Y=25
B=2	H=8	N=14	T=20	Z=26
C=3	I=9	O=15	U=21	space=27
D=4	J=10	P=16	V=22	period=28
E=5	K=11	Q=17	W=23	question mark=29
F=6	L=12	R=18	X=24	comma=30

a. Using the code: What does the following message say?
19, 21, 5, 30, 27, 4, 9, 4, 27, 23, 5, 27, 23,
9, 14, 27, 25, 5, 20, 5, 18, 4, 1, 25, 29

b. After several others figured out Bill's secret code, he added five to each number.
i.e. A = (1+5) = 6
B = (2+5) = 7
C = (3+5) = 8 Put the following message in the new code.
GOOD LUCK

c. Besides adding 5 to each number, what else could Bill do to make his code more secretive?

Eighth Grade Idaho Direct Mathematics Assessment

#8-010 Eighth-Grade Practice Prompt *Patterns and Functions*

Susan gets a job at a local fast food restaurant. For the first 10 hours that she works, she is considered to be "in training" and will only make $4.50 an hour.

a. Complete the table showing what Susan will make after working the number of hours listed.

hours	0	1	2	3		8	9	10
wages	$ 0	$ 4.50	9.00					

b. After the 10 hours of training, Susan gets paid $5.15 an hour. Including the training, how much will Susan get paid for working her first 30 hours?

c. Susan puts 20% of her paycheck into savings. She also has to pay $40.00 for her uniform. If Susan's first paycheck is for 30 hours, how much money will she have left to spend?

Eighth Grade Idaho Direct Mathematics Assessment

#8-011 Eighth-Grade Practice Prompt *Patterns and Functions*

The technology class is making new locker number plates for the lockers in the eighth grade hall. Each digit comes on a separate plate. The lockers are numbered consecutively. The class needs to know how many of each digit plate to make.

a. How many of each digit are needed to number lockers from 1 to 30?

b. How many of each digit are needed to number lockers from l to 100?

c. How many of each digit plate would be needed to number lockers from 125 - 216?

Eighth Grade Idaho Direct Mathematics Assessment
#8-012 Eighth-Grade Practice Prompt *Patterns and Functions*

Mary is having a birthday party. Her mother brings in a bowl with 16 pieces of candy, and passes them out to all the children. Each child takes a piece, in turn, until the bowl is empty.

a. If Mary took the first piece, and the next to the last piece, how many children were at the party?

b. Draw a diagram of the children and explain how you determined your answer.

c. Suppose any of the children could have had more than one piece of candy, and Mary still got the first and the next to the last piece. Is there any other possible number of guests at the party? If so, what are they?

Eighth Grade Idaho Direct Mathematics Assessment
#8-013 Eighth-Grade Practice Prompt *Patterns and Functions*

Sara noticed, when she stacked her quarters in piles of 5, she had 3 left over. When she stacked them in piles of 7, she had 5 left over.

a. If Sara has less than $10 worth of quarters, how many quarters does she have?

b. If Sara wanted to buy a new computer game that costs $20, how many more quarters would Sara need? (Remember to include Idaho's 5% sales tax.)

c. Sara will save 2 quarters each day, to add to what she already has, starting on a Wednesday. On what day of the week will Sara have saved enough money to buy the computer game?

0	1	2	3	4	5	6
1	2	4	7	11	16	
2	4	8	15	26		
3	7	15	30	56		
4	11	26	56	112		
5						
6						

a. Complete the table of numbers by filling in the boxes with the missing numbers of the pattern.

b. Explain how each new row of the table is generated.

Eighth Grade Idaho Direct Mathematics Assessment
#8-015 Eighth-Grade Practice Prompt *Patterns and Functions*

									Number of Numbers	Sum of Numbers
Row 1				1						
Row 2			3		5					
Row 3		7		☐		11				
Row 4	13		15		17		☐			
Row 5	☐		23		☐		27	29		

a. Complete the triangular table of numbers by filling in the boxes with the missing numbers of the pattern.

b. Find the number of numbers in each row, and the sum of those numbers.

c. If the triangular pattern were continued through the tenth row, how many numbers would be in the <u>entire</u> table?

d. Describe the relationship, if there is one, between the row number and the sum of the numbers in that row. If the triangular table were continued through the twelfth row, find the sum of the numbers in the 12^{th} row of the table.

Eighth Grade Idaho Direct Mathematics Assessment
#8-016 Eighth-Grade Practice Prompt Geometry and Measurement

Jill has a piece of paper that measures 8 1/2 by 11 inches. She has cut it into strips that are 1 inch wide, placed them end to end on a table, and taped them together.

a. Draw a diagram that shows her new strip, and label the length and width.

b. How long is her new strip?

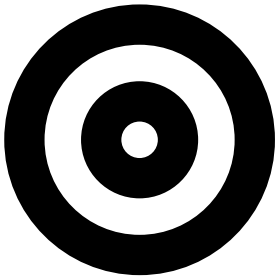
c. What is the perimeter of her new strip?

d. What is the area of the new strip?

e. If the strip had been 2 3/4 inches wide, how long would her new strip have been?

f. What would be the perimeter of this strip have been?

Eighth Grade Idaho Direct Mathematics Assessment
#8-017 Eighth-Grade Practice Prompt *Geometry and Measurement*



The target shown above is made of 4 circles with radii of 3, 4, 5, and 6 inches.

a. What is the area of the white center circle (radius 3 inches)? Use 3.14 for Pi.

b. What is the total area of the target's surface? Use 3.14 for Pi.

c. If a dart is thrown and randomly hits the target, what is the probability that the white center will be hit? Explain how you found your answer.

Eighth Grade Idaho Direct Mathematics Assessment
#8-018 Eighth-Grade Practice Prompt *Geometry and Measurement*

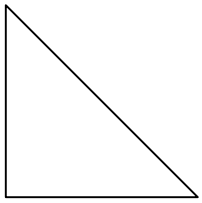
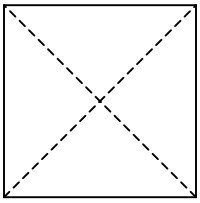
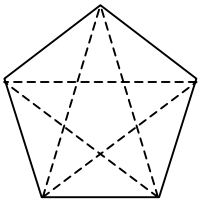
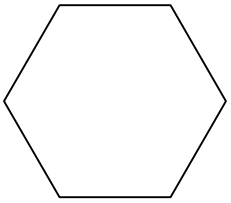
A rectangular field is 20 meters wide and 30 meters long.

a. Find the perimeter and the area of the field.

b. Add the same number of meters to both the width and the length so that the area of the field is doubled. What is the perimeter of this larger field?

c. If the length and the width of the original field is doubled, what would the resulting field's area and perimeter be?

Eighth Grade Idaho Direct Mathematics Assessment
#8-019 Eighth-Grade Practice Prompt *Geometry and Measurement*

3 Sides (0 diagonals)

4 Sides (2 diagonals)

5 Sides (5 diagonals)

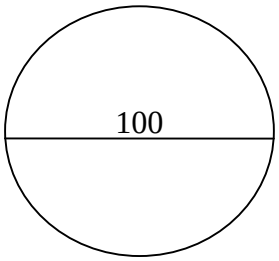
6 Sides (___ diagonals)

a. In the space provided, draw in the diagonals for the six-sided polygon.

b. How many diagonals are there in an 8-sided polygon? Show or explain how you found your answer.

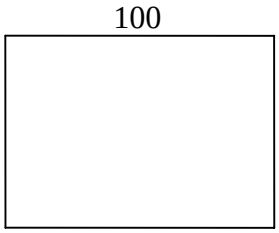
c. Explain how you would determine the number of diagonals in a 15-sided polygon.

Eighth Grade Idaho Direct Mathematics Assessment
#8-020 Eighth-Grade Practice Prompt *Geometry and Measurement*



$A = \pi r^2$

$C = \pi d$



$A = LW$

$P = 2(L+W)$

a. What is the area of the circle? (Use 3.14 for π)

b. What is the circumference of the circle? (Use 3.14 for π)

c. What is the area of the rectangle?

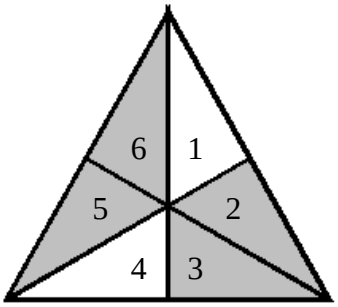
d. What is the perimeter of the rectangle?

e. Complete the table.

SHAPE	AREA	PERIMETER/CIRCUMFERENCE
Circle		
Rectangle		

f. Compare the areas and perimeters of the two shapes. Based on this information, what can you infer is the relationship between circles and rectangles?

The spinner below is an equilateral triangle, with the divisions made at the midpoints of the sides.



a. Why is the probability of spinning a one the same as the probability of spinning a six?

b. What is the probability of spinning an even number?

c. What is the probability of spinning a black?

d. What is the probability of spinning **both** a black and an even number?

Eighth Grade Idaho Direct Mathematics Assessment
#8-022 Eighth-Grade Practice Prompt *Probability and Statistics*

Annette has earned the following scores on her tests: 83, 86, 92, 86 and 96.

a. Find the mean, median and mode of her scores.

b. Which answer (mean, median, mode) is the best representation of her final grade?

c. If Annette takes another test, what is the highest possible average she could receive on all six tests?

d. What score on the next test would Annette have to receive in order to have an average of 90% or higher on her tests?

Eighth Grade Sample Lesson Plan:
Preparation for the Direct Mathematics Assessment

Focus: Student preparation for the Direct Mathematics Assessment

Standards: Vary depending on the prompt selected.

Objective: The student will be able to do the following: Students will show proficiency with the Idaho Mathematics Achievement Standards by successfully completing a DMA prompt with a rubric sore of 3 or 4.

Materials: DMA Toolkit (SDE website: http://www.sde.state.id.us), paper, calculator, and pencil.

Explanation of Instructional Activity:

1. Explain the purpose of the DMA. Give an overview of the DMA. Read the instructions for the DMA.

2. Hand out one practice prompt and give students 20 minutes to complete the prompt.

3. Explain the scoring rubric. (*Note: Steps 2 and 3 may be interchanged*.)

4. Show the students examples of what 4, 3, 2, and 1 papers are (in this order), and the differences between them.

Suggestion: Have each student score another student's paper. Have volunteers share what they feel is (at least) a 4, 3, or 2 paper by presenting the student work on the board.

5. The teacher brainstorms with the class on what might make the 2 paper a 3 paper and what might make the 3 paper a 4 paper.

6. Repeat (at least) weekly, starting with the first week of school.

Feel free to modify, add to, or change this to make it work for your students!

Eighth Grade Sample Lesson Plan:
Are Your Walls Leaning?

Focus: **Measurement and Geometry**

Concept: **Apply the Pythagorean Theorem**

Objectives: **Students will be able to do the following:**

- Measure with centimeters.
- Use Pythagorean theorem to test accuracy of construction.
- Determine from collected data the direction of the leaning wall.

Idaho Achievement Standards: 341.02 – Apply the Geometry of right triangles.

Content Knowledge and Skills: 341.02.a – Investigate right triangle geometry using the Pythagorean Theorem.

Procedure for Teaching:

1) Students are divided into groups. Each group is given a meter stick and some tape. The groups are assigned to check walls in the school, to see if they are leaning. Their job is to figure out which way their wall will fall in an event of an earthquake.

2) Students should measure some distance up the wall and work their location with a small piece of tape (side a). They then measure a distance away from the wall on the floor and mark it with a piece of tape (side b). Using a longer piece of tape they should connect their floor and wall points. This longer piece of tape acts a s the hypotenuse's to their triangle (side c).

3) Students should then figure $a^2 + b^2$ and see if it equals c^2. Then measure the hypotenuses and figure if it is two long or too short. The group then reports to the class their findings.

Materials and Resources:

Meter sticks for each group

Pieces of masking tape for each group

Calculate for each group would prove useful.

Feel free to modify, add to, or change this to make it work for your students!

**Note: This sample lesson plan also appears in the Pre-Algebra Course of Study*